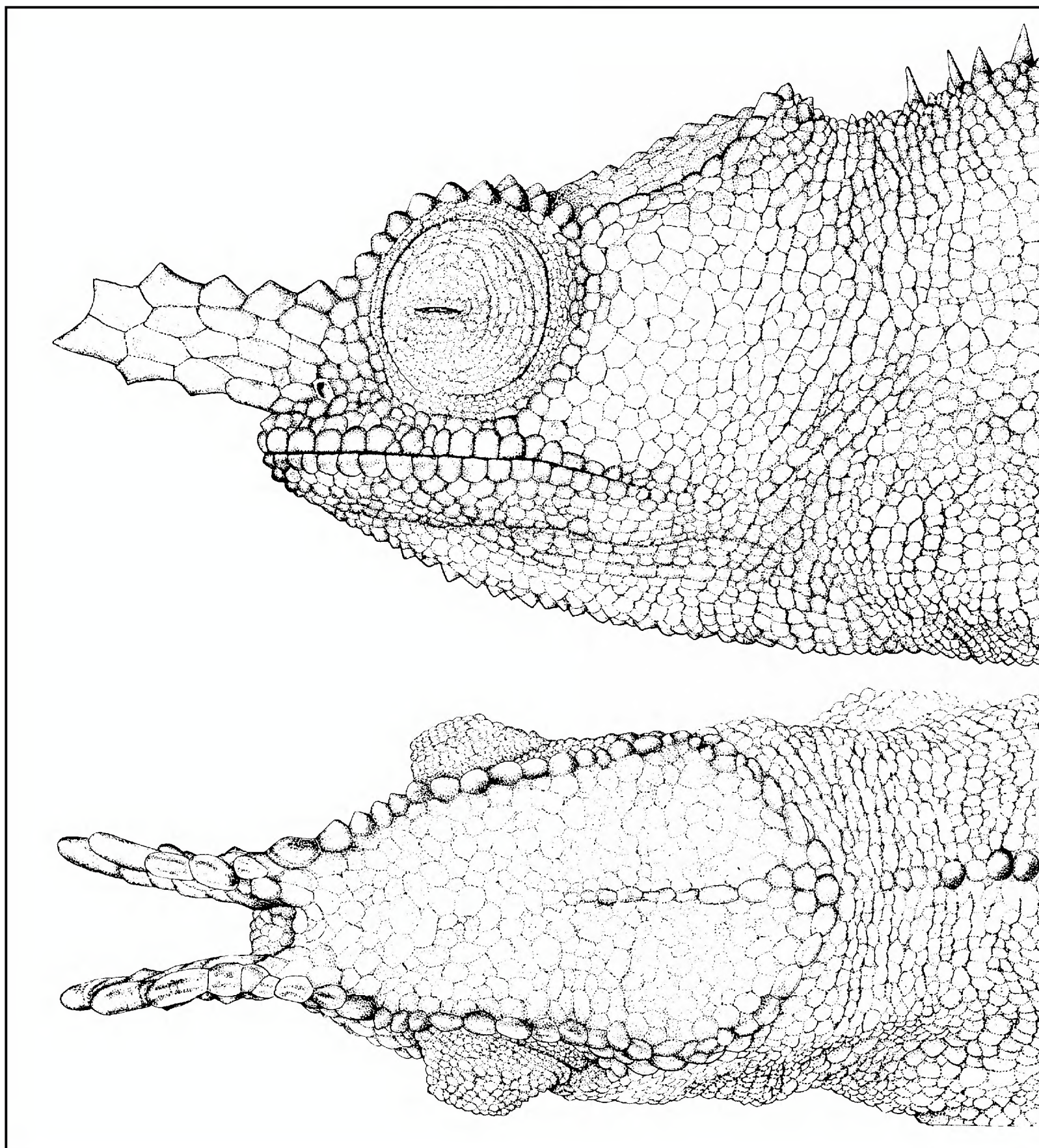

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BULLETIN OF THE CHICAGO HERPETOLOGICAL SOCIETY

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Note on Reproduction of *Phyllodactylus angustidigitus* (Squamata: Gekkonidae) from Peru

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Abstract

A histological examination of gonadal material from *Phyllodactylus angustidigitus* collected in November–December in Peru was carried out. The smallest mature male *P. angustidigitus* (late spermiogenesis) measured 45 mm SVL; the smallest mature female (oviductal egg) measured 48 mm SVL. One female contained an enlarged follicle (3 mm) and concurrent microscopic yolk deposition in a separate follicle indicating *P. angustidigitus* can produce more than one clutch in the same reproductive season. High percentages of *P. angustidigitus* from December, nearing the end of reproductive activity suggests seasonality, in the form of a period of reproductive inactivity, to be followed by a subsequent recovery and resumption of reproduction, as occurs in other lizards.

The narrow leafed-toed gecko, *Phyllodactylus angustidigitus* Dixon and Huey, 1970 is known from the beaches of Paracas Peninsula, Department of Ica, and associated islands, Peru (De Lisle et al., 2013). To my knowledge, the only information on reproduction of *P. angustidigitus* is a report of clutches of one egg (Dixon and Huey, 1970). In this note I provide additional information on *P. angustidigitus* reproduction from a histological examination of museum specimens.

I examined 41 specimens (loan 2015-11) of *P. angustidigitus* deposited in the Biodiversity Research and Teaching Collection (TCWC), Department of Wildlife and Fisheries Sciences, Texas A&M University, College Station, Texas, USA. The sample consisted of (17 males, mean SVL = 49.6 mm $\pm$ 2.9 SD, range = 45–54 mm; 20 females, mean SVL = 50.1 mm $\pm$ 1.9 SD, range = 48–54 mm; 1 subadult male, SVL = 35 mm; three subadult females mean SVL = 42.3 mm $\pm$ 2.3 SD, range 41–45 mm) collected November–December 1968, 19 km SW of Paracas near Puerto Pisco, (13.71667°S, 76.21667°W), Department of Ica, Peru (Appendix).

A cut was made in the lower abdominal cavity and the left testis or ovary was removed, embedded in paraffin, cut into 5 μ m sections and stained with Harris hematoxylin followed by eosin counterstain (Presnell and Schreiber, 1997). Enlarged yolking follicles (> 3 mm) or oviductal eggs were counted. No histology was done on them. Slides were examined to determine the stage of the testicular cycle or the presence of yolk deposition or corpora lutea. Histology slides were deposited at TCWC. An unpaired *t*-test was used to compare adult male versus female mean SVLs using InStat (Graphpad Software, San Diego, CA).

The difference between adult male and female mean body sizes (SVLs) was not significant (unpaired *t*-test, *t* = 0.643, 35 *df*, *P* = 0.64). Three stages were noted in the testicular cycle (Table 1): (1) Spermiogenesis (= sperm formation), lumina of the seminiferous tubules are lined by clusters of sperm or metamorphosing spermatids; (2) Late spermiogenesis, layers of germinal epithelium and constituent spermiogenic cells are greatly reduced in number; the period of spermiogenesis is coming to a close; (3) Regressed, germinal epithelium is exhausted and consists of 1–2 layers of spermatogonia and inter-

persed Sertoli cells. The smallest mature male measured 45 mm SVL (TCWC 28020) and contained a testis that exhibited late spermiogenesis. One smaller male (TCWC 27955) that measured 35 mm SVL contained a tiny reproductively inactive testis and was considered to be a subadult.

Four stages were present in the ovarian cycle of *P. angustidigitus* (Table 2): (1) Quiescent, no yolk deposition; (2) Early yolk deposition, vitellogenic granules in the ooplasm; (3); Enlarged follicle > 3 mm (4) Oviductal egg. Mean clutch size (*n* = 7) was invariant 1.0. One female with an enlarged yellow follicle of 3 mm diameter was undergoing microscopic yolk deposition in a separate follicle for a subsequent clutch (TCWC 27956) indicating *P. angustidigitus* can produce more than one clutch in the same reproductive season. The smallest reproductively active female (one oviductal egg) measured 48 mm SVL (TCWC 27952). Two smaller females (SVL = 45 mm, TCWC 28047; SVL = 41 mm, TCWC 28055) contained tiny reproductively inactive ovaries and were considered to be subadults. Production of clutches of one egg appears typical for South American *Phyllodactylus* (Dixon and Huey, 1970), although, in an apparent exception, *Phyllodactylus reissi* from Peru produces clutches of 1-2 eggs (Dixon and Huey, 1970; Goldberg, 2007). The presence of 9/17 (53%) of *P. angustidigitus* males from November–December in late spermiogenesis or with regressed testes (Table 1) and 12/20 (60%) females from November–December with quiescent ovaries (Table 2) indicates the current period of reproduction is approaching its end, suggesting seasonality in the form of a period of reproductive inactivity, to be followed by a subsequent recovery and resumption of reproduction as occurs in other lizards.

Examination of reproductive data from the congeners *P. reissi* (Goldberg, 2007) and *P. inaequalis* and *P. microphyllus*

Table 1. Stages in the testicular cycle of 17 *Phyllodactylus angustidigitus* from November–December from Peru.

Month	N	Spermiogenesis	Late spermiogenesis	Regressed
November	3	2	1	0
December	14	6	5	3

Table 2. Stages in the ovarian cycle of 20 *Phyllodactylus angustidigitus* from November–December from Peru; * = one female with an enlarged follicle and concomitant microscopic yolk deposition in a separate follicle.

Month	N	Quiescent	Early yolk deposition	Enlarged follicle > 3 mm	Oviductal egg
November	8	5	0	1*	2
December	12	7	1	2	2

(Goldberg, 2008) from Peru revealed much higher percentages of reproductive activity during November–December as compared to *P. angustidigitus* described herein: *P. reissi* 32/36 (89%) for females, 30/30 (100%) for males; *P. inaequalis* 9/10 (90%), for females, males not available; *P. microphyllus* 3/5 (60%) for females, males not available, suggesting differences in reproduction may exist between these three species. Reproductive examination of *P. angustidigitus* from different months are

required before the reproductive cycle of this species can be ascertained.

Acknowledgment

I thank Toby Hibbitts (TCWC) for permission to examine *P. angustidigitus*.

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Appendix

Phyllodactylus angustidigitus from Peru examined from the Biodiversity Research and Teaching Collection (TCWC), Texas A&M University, College Station, Texas, USA. TCWC: 27945, 27950, 27952, 27955, 27956, 27961, 27963, 27965, 27971, 27974, 27976, 27979-27981, 27983-27985, 27987, 27990, 27992, 27995, 27996, 27997, 28008, 28013, 28015, 28019-28022, 28030, 28034, 28037, 28038, 28043, 28047, 28051-28053, 28055, 28062.

Cutting to the Chase with Snakes

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Back in 1981 (when we were *all* much younger), the author was employed by a manufacturing firm called Precision Machining Sheetmetal here in Tucson. Those of us who worked there seldom called it by its proper name, choosing instead to make an acronym of it. We found PMS more to our liking, as it summed the situation up nicely. I worked as a milling machine operator, side-by-side with a large fellow by the name of Jimmie. One fine August morning, Jimmie was sweeping up behind our parallel-aligned milling machines, and suddenly looked at me all sorts of wide-eyed.

“Whoa dude! There's a snake back here!”

While I wasn't quite the passionate herper that I am today (in other words, almost normal), snakes were still of great interest. I hit the stop button on my machine, and circled back to see what Jimmie had found. I was surprised to see a dinky little neonate Checkered Gartersnake (*Thamnophis marcianus*) on the concrete floor, amongst the metal chips and sprawled air hoses. While I admired the find, Jimmie disappeared for a second. When he reappeared, he had a big ball peen hammer in hand. His intent was clear.

“No Jimmie, you don't have to kill it. It's just a Gartersnake — I'll take it outside.”

For a second, it seemed that would be the end of the story. But then the Gartersnake made a fatal mistake. The little snake, barely 8 inches long, gaped its mouth wide open — exactly like a Cottonmouth. I can still vividly recall the bright pink interior in the maw of that little snake. He had his jowls so wide open that I thought that its head would split in half. And then, without further provocation from either of us, the snake undulated toward Jimmie. As it advanced, it kept its head cocked high, and maintained the wide open gaping display.

“See that? He's coming to get me!” Jimmie exclaimed, “Now he's *mine*!” With that statement, Jimmie stepped forward, hammer in hand, and cocked his arm in readiness to start dealing some death blows.

As I said, Jimmie was a large fellow, but I didn't actually realize how large he was until I jumped on his back. I tried to lock my arms around his torso, but he was so big that my fingertips were six inches away from each other. I am not a small man either, and my arms are long — but apparently, not long enough to wrap up Jimmie. Having 220 pounds of Roger on his back didn't slow Jimmie down even a little bit. He bent over as if I were weightless, and pounded that poor little snake to a bloody pulp. There was *nothing* I could do to stop him.

I would have probably been next, but all the shouting drew in the shop manager, who was easily more fearsome than the two of us combined. He pried us apart, got between us, and drilled us both, abruptly offering to help us to join the ranks of the unemployed if we didn't shake hands like men and get back to work. This we proceeded to do, each trying to mangle the

other's hand in the process. I promptly went back to my machine. Under the orders of the boss, Jimmie had to mop up his mess first. Of course, the taunting and baiting that followed was legendary, and lasted until the day I moved on, several months later.

We tell this story to honor an eight-inch Gartersnake that with a valiant last act of defiance, attacked a 300-pound giant.

On 19 March 1996, I was flipping boards surrounding a dilapidated hog farm. With me on this day was Erik Enderson, who was at that time a fairly new arrival to the herpetological scene. As such, he had yet to find his niche. Perhaps as a result of what happened next, he branched into studying amphibians and plants. During the course of the board flipping, I snagged a whopper of a Coachwhip (*Masticophis flagellum*). It was over five feet in length, which as big as they get around here. Erik was and still is an excellent nature photographer, and he took several images of the Coachwhip being restrained in my hands. He next wanted some more natural shots on the ground, so I held the snake by the tail while he circled it and snapped some pictures. He next wanted to try to get some full body shots, and the only way to make that happen was for him to stand in front of the snake, and have me let it go on his command. The command was given, I released the Coachwhip, and the chase was on! The snake wasted no time whatsoever in launching itself straight at the distraught photographer, who was no doubt more accustomed to subjects that were a little less intimidating. He saw that snake coming, and began to backpedal. The snake gave chase, and launched three crotch-high strikes at the poor guy. Each strike almost connected with a very tiny moving target. At the point of the third strike, the future frog guy turned tail and fled in all-out terror from it. The snake continued the chase for a short distance, and then dove under cover. I found the whole situation quite funny, and began to roar with laughter. It was next learned that future frog people find it very unbecoming to be laughed at by snake geeks. He mentioned this several times in the lengthy and profane discourse that followed. Of course, all this was somehow my fault.

Along these lines, it's time to hear from the Great One himself. The following is a verbatim quote from pages 203–204 of *Snakes and Snake Hunting* by Carl Kauffeld, Hanover House, 1957:

I was walking slowly along the bottom of the causeway embankment, stopping frequently to rake through the hay mats which were the favorite hiding places of Kings and Mud Snakes, as described elsewhere. Suddenly I felt something catching at my trouser leg and when I glanced down, there was a three-and-a-half-foot Black Racer coiled and poised as dramatically as any angry rattlesnake and lashing out at me in long lunges that usually reached their mark because I made no effort to avoid them. I was highly amused and amazed at the fantastic courage and anger of the snake, and I let him persist in his display of violence until I tired of it. Then, because I already had more Black Racers than I wanted, I didn't bother to catch him, but lifted him on my hook and flung him as far as I could — a matter of twenty-five or thirty feet.

Going about my business of searching the hay mats, I was amazed when very soon the snake was back again, renewing the attack with unabated fury. This was too much! Again, I flung him away from me, and again, he returned. I think we could have played this game indefinitely, but I was more interested in what the hay mats held than in learning just how persistent a Blacksnake could be, so I caught him and placed him in a bag and continued on my way.

During the late morning of 25 October 2015, this lesser author beheld a dandy Gophersnake (*Pituophis catenifer*), roughly four feet long, lying nearly straight out on a dirt road. I got out of the vehicle, and photographed it from all angles. By all angles, I mean just that. I slowly walked up to it, loomed over top of it, and even walked to the other side of it, snapping images the whole while. When finished with the process, I gently bare-handed it, and carried it to the side of the road it was facing. I set it down on the berm, and there was not a hint that would indicate that the snake was in the least offended. But upon release, the snake began to crawl down the berm, and toward me. I once again scooped it up, and placed it on the berm, and once again, it turned and began to crawl toward me. When I tried to pick it up the third time, it absolutely erupted on me! It began launching vicious swipes at my backpedaling knees, until such time as I ran out of road. At that point, I stood my ground. A split second later, the snake's teeth were hooked into the fabric of my ripcord nylon pants, just below my left knee. I gently grabbed it behind the head, twisted the snake free, and walked it back across the road again—just to see what it would do. It of course jetted back onto the road, but this time, I was well out of its pathway upon release. It blazed across that road with a speed that would make any Coachwhip envious. It evaporated into the undergrowth seconds later.

A similar situation happened on a warm and humid summer night, when I came across a massive (~3.5 foot long) male Mojave Rattlesnake (*Crotalus scutulatus*—or simply “scut” to us Arizona herpers) lying nearly straight out in the center of the eastbound lane of a wide dirt road. As this road at times receives heavy traffic, it was my intent to move him quickly before proceeding onward. I snatched him mid-body with my Whitney snake tongs, and started to run to the south side of the road with him—the side he was facing. As soon as I grabbed him, he began thrashing wildly in the tongs. He almost broke out of them, such was his exertion. I barely got him across the road, and rather roughly dropped him on the upraised berm. As soon as he hit that berm, he gathered himself, and jetted straight for me. While statistics may point to a snake only being able to strike one-third of its body length, don't you rely on it! The first strike was generated from the top of the road berm, which was roughly knee-high there. He delivered the strike with such enthusiasm that the momentum and follow-through propelled him forward. He almost flew at me! I took a step backward, and he landed with an audible plop at my feet. As soon as he hit the ground, he gathered himself and sprang forward again! As I was not about to stand still while my legs took a beating, I backpedaled again. And again. And again. The road is perhaps 60 feet wide here. For that entire distance, the snake gathered, struck, gathered, and struck again in rapid succession. Wham, wham, wham! And even though I was now running backwards, he was keeping up with me. Each time, he missed me by inches. When I ran out of road, I cut away from the snake, turned tail,

and ran as fast as I could for about 50 feet or so. Then I turned to see what was going to happen next. He was standing half a body length tall on the berm of the road, rattling fiercely, glowing at me, his black forked tongue wavering in the air in menacing fashion. It was a magnificent and defiant pose, which he held for well over a minute. He eventually lowered his stance, and began a slow and uneasy backward retreat, his eyes locked on me as he slipped off into the night. He was soon out of sight, with only his singing rattle indicating his presence.

In the early hours of 1 August 1994, I was with the horned lizard queen, one Wendy Hodges. We were somewhere in the dunes country near Yuma, Arizona. Wendy was there as part of her Ph.D. research process, surveying different areas for Flat-tailed Horned Lizards (*Phrynosoma mcallii*). Her job was to walk lines of flagging, counting horned lizard scats, while seeking visuals on the thorny little rascals as well. Researchers sure do know how to have fun! My job was to stay out of her way, while having the time of my life following Sidewinder (*Crotalus cerastes*) tracks, which were in great abundance in the area. I followed one track that issued from a large, elliptical opening under some Creosote and, much to my delight, came across a Sidewinder cratered deeply in the loose sand. The snake was coiled roughly three meters from the burrow. The angle of the sun was such that my best photo opportunity had me standing between the snake and that burrow. I carefully went down to one knee, and began to bracket the snake. For the first photo, the snake remained motionless. I began to shift for the optimum angle, the “money shot.” As I did, my shadow passed over top of the snake. The snake then cocked its head slightly upward, glared at me, and a black forked tongue wavered menacingly forth. A split second later, it exploded from its crater, sending little showers of sand in all directions. It came straight at me, striking left and right, each time narrowly missing my rapidly retreating foot apparel. As soon as I cleared the entranceway to the snake's shelter, it quickly 'winded its way into the hole. The sound of the rattle buzzing furiously diminished in intensity the deeper the snake crawled. The Doppler effect of the piercing rattle dwindling to silence was surrealistic, and left me wondering “Wow—did that *really* just happen?”

While on the subject of Sidewinders: I was driving a favored dirt road in my beloved Sidewinder Spot late one summer evening, when I observed a Great Horned Owl in the middle of said road. Decorating either side of said owl were two Sidewinders. One was closer to me in my lofty and comfortable perch, the other was on the other side of the owl. Hoping to catch some predatory action, I readied my camera, and dimmed the lights. The owl suddenly became a poopsock about it all, and promptly flew off. There was little else to do but get out of my truck and admire the Sidewinders. As I approached the closer one, it immediately charged lickety-split right at me, while rapidly firing off quick but short strikes. Those who observe Sidewinders on nature films often only see their undulations in slow motion. Truth be told, they can really jet across the ground—much like rippling greased lightning. So, here comes the first 'winder, jetting across the ground straight at me, while pecking away at the air, its strikes falling way short of the mark. I could have had some fun with this by backing off, and seeing if it would give chase. Instead, I squandered the opportunity by

snagging it with my tongs, walking it several paces behind me, and dropping it to the side of the road. (Henceforth, I will follow the techniques of the Great One, and simply flip them 25–30 feet away). Once that snake was dealt with, I moved on to the second. This one proceeded to do the *exact* same thing! Again, a lightning fast, straight-on, undulating attack accompanied by short, snippy little strikes. Once again, the opportunity to play some chasing games with this second 'winder was squandered when I snagged it and placed it close to the first one. Then, off I went, and that's the end of this particular encounter.

The next incident is not my own to tell. The following event was gleaned from pages 263–264 of *The Snakebite Survivor's Club: Travels among Serpents* by Jeremy Seal, Harcourt Inc., 1999. (I *highly* recommend this fascinating book for all lovers of venomous snakes).

On 31 August 1991, Clive Brady was taking a combined hike and swim in the Barron River located in Queensland, Australia. While hiking on a trail along the river, he was distracted, and then . . .

For a few seconds, these thoughts had carried him forward and kept his glance from the track ahead of him. It was as if he had temporarily relinquished the right of way. So it was that when Clive next looked ahead of him, a large snake had taken possession of the track in his absence and was moving straight towards him. It was a taipan. . . .

The taipan was about six foot away. It's rolling, copper-coloured body was travelling fast, its head clear of the ground.

"It was a six-footer," said Clive, "and it just looked like it meant trouble."

He tried to get clear, moving to jump down into the thicker weeds just above water's edge. But he was sixty-four and his knee was gammy, and he saw the snake "a yellowish flash," coming at him from the corner of his eye, even as he began to move. For a split second, he knew he was about to get bitten and he guessed dying must feel like this, and he wished he'd gone to the races. With an elastic uncoiling, the snake flew at Clive, striking him on the left knee and knocking him off his feet. He grunted and landed heavily. From the ground, he watched the snake disappear into the scrub.

Everything had gone quiet. It wasn't supposed to happen like that, thought Clive. OK, taipans were known to be aggressive at this time of year, but they weren't meant to make for you plain as day, arrowing across open ground like this one had. He looked down at the puncture marks just below his knee, several tiny pairs of blood spots, some of them smeared now. Later, they would tell him that the taipan had struck him seven times.

On the morning of 23 September 2006 at 0950 hours, Gordon Schuett and I radio-tracked one of our female Western Diamond-backed Rattlesnakes (*Crotalus atrox*) to the source of her signal. She was not visible, buried in a tight soil hole under a prickly pear cactus. While she was not visible, she had a very large boyfriend who was. Her hidey hole was too tight for him to enter. Hence, as is their wont, he was likely waiting for her to emerge so that he could woo her. When it comes to seeking a mate, *atrox* can be extremely patient—if not downright dogmatic. His massive size alone indicated that we did not know this snake in the scientific sense. He was new blood!

Hauling a large *atrox* out of prickly pear is seldom an easy proposition. Indeed, my advice was "Just leave him, Doc." But would he listen to his lackey? Of course not! He burned roughly 1,000 horsepower of energy poking at this new *atrox* with his

snake hook, while trying to snag him with his tongs. With but maximum difficulty, he dragged it out of the cactus, and plopped him onto an open patch of ground. Normally, bagging a snake that is on open ground is duck soup, but this *atrox* was having none of it. As soon as he hit the ground, he whirled to face Gordon, and charged straight at him. Gordon began to back-pedal, and in much the same fashion as the road scut described earlier, the snake began the process of launching furious knee-high strikes at Gordon's retreating form. Exactly like that road scut, his strikes carried such momentum that he was almost flying through the air at Gordo. The first chasing sequence lasted roughly 30 feet, when Gordon turned tail and fled away from it all. The big guy then stood his ground, head held high, rattles singing to the accompaniment of explosive hissing. His head swiveled to bear down on whichever one of us moved. The ground temperature was a sizzling 103°F, which did not help matters any. We had a very hot (in more ways than one), very alert, and very dangerous rattlesnake on our hands. And we had just dragged him away from his girlfriend, while peppering his flanks with pernicious prickly pear cactus spines. Oh yeah, this brute was *not* a happy camper. He had every reason in the world to hate us. Once again, the lackey advised that we just leave him alone, lest one of us wind up picking our nose with an elbow. But would Schuett listen to me? Of course not! Once on a capture mission, there is no such word as fail to the spunky scientist. He coveted 0.2 milliliters of blood from the snake's tail, and nothing would stop him from getting that.

I've never been a big fan of Schuett's bagging technique, and have told him so many times. But I said nothing as he spread the sack out flat on the ground, and started to move in on the snake. His intent was to grab the snake with the tongs, lift the bag open with his snake hook, and encourage said snake to enter the bag. Worming a wet noodle up a wildcat's ass would be simpler process. Schuett made a mid-body grab on it with his tongs, and began to move him toward the sack. But at the first contact of the tongs, the snake made it clear that he had other plans. He began thrashing violently, slinging musk from his tail in all directions. The air was full of hissing, the stench of angry rattlesnake, and—issuing from Schuett's gullet—a scorching and creative run-on sentence that included every cussword contained in the English language. Watching that snake thrash in those tongs brought to mind playing a killer whale on a fly rod. The snake flung himself out of the tongs, hit the ground, gathered himself, and made an all out assault on the hapless herper. Somehow, just before the bull rush ensued, Schuett snagged his backpack, and thrust it into the face of his attacker. The snake launched strike after strike at that backpack—the sound of the punches hitting the pack was audible. Double-barreled streamers of viscous venom flowed down the pack. Gordon began to back-pedal, and the big guy came on, punching that sopping wet backpack all the way. Gordo began to use his backpack like a matador might use his cape on a charging bull, thrusting and parrying off each strike, while retreating as fast as a human being can run backwards. Finally, he dropped his pack on top of the brute, which gave him just enough time to turn around and flee to a safe distance.

My assistance came in the form of gales of uncontrollable and uproarious laughter. I was helpless to help, so to speak.

From the second that atrox gave the first chase, to the thrashing out of the tongs episode, to the matador act and beyond, I was laughing so hard that I couldn't even get a sentence out. (AH-Ha-ha-ha-ha, hee hee, ho ho), "Look out Gordie," (hee hee ho ho), "look at that" (tee hee). (Ah Har-de-HAR) "He's gonna getcha Gordie," (ho ho), "*run* Gordie, *run!*" (AH-HA-HA-HA), "Look out," (snort snort, OH-HO-HO-HO), "I said," (tee hee), "no, I said" (har har), "just leave him be, but NO-O-O-O, you had to go and . . ." (BWA-HA-HA-HA), "Toro! Toro! Toro!" (Whoa-ho-ho-ho). "That's the ticket—way to teach him a lesson Gordie." (AH-HA-HA-HA) . . . "*This is the funniest thing I've ever seen*" (Snickering, slapping knees, braying like a jackass—AH-HA-HA-HA). "Stop! You-you-you're *killing* me!" (BWA-AH-HA-HA-HA, snort, wheeze, gag, AH-HA-HA-HA) and so on. There is nothing like good, clean fun in the field.

I eventually got myself under control, and together, we eventually got Leviathan—as we later named him, under control. It is interesting to note that it was all that two grown men could do to get this snake in a bag. We outweighed him 200 to 1, and are supposed to be at least 5% smarter than he. Four hands, resplendent with opposable thumbs, each holding state-of-the-art snake-catching equipment, were utilized in the process. We proved that us herp geeks can conquer anything, provided that it's small enough, and we can get the proper drop on it. Since a full and thorough processing followed, we know that Leviathan was 44.5 inches total length, with a mass just shy of two pounds. He was the second largest atrox to ever be processed in the area, out of 138 different atrox, over the course of 14 years. Leviathan went into our data binder as "one bad dude." But we got his blood—and lucky we are that he didn't get any of ours!

Discussion

This article was inspired by a public statement that my good friend and colleague Matt Goode once made at a Tucson Herpetological Society meeting many years ago. His statement, which

generated a hot rebuttal from the guy sitting in my chair, was as follows: "We all know that snakes never chase people." I believe that my introductory objection to Matt's statement began with a brief, vulgar, and loud comparison to what is ejected from the south end of a northbound male bovine. The ensuing discussion stunk up the meeting room for no less than half an hour, and would continue to this very day if we ever thought to bring it up again. Matt and I are still friends, we will *always* be friends. But that doesn't mean that we always agree on everything.

I do feel that those of us who enter the field seeking snakes might not see chasing behaviors simply because we do not allow them to develop. Our actions are often based on catching the snake as soon as we see it. Kauffeld's incident with the Black Racer could have been a lot more interesting if he had played it differently, and I also was guilty of wrecking a laughable chase by intervening with the two attacking Sidewinders involved with the owl incident.

This article was written to entertain, while hopefully being informative in the process. I deliberately kept it lighthearted. The temptation to launch into deep explanations after each observation was very great, but would only result in my own speculation as to the why of it all. In my circle of friends, speculation often leads to ridicule. Truth be told, the events were laid out in such fashion that any thinking reader can hang their own assumptions on them, and probably arrive at similar conclusions.

But there is one observation in this article that makes zero sense to me. Perhaps the reader can enlighten me? We speak of the little Gartersnake that went after Jimmie. The only direction my mind can take me has me trying to think like that snake. I'm afraid to put in print what I *really* think happened here. With all the studies done on snakes in the past and present, and even into the future, will we ever truly know the mind of a snake?

This here is Roger Repp, signing off from Southern Arizona, where the turtles are strong, the snakes are handsome, and the lizards are all above average.

What You Missed at the February Meeting

John Bellah
john_bellah@yahoo.com

Our February speaker was Sam Fellows, who braved a snowstorm to come down and present his tales of tracking down one of Wisconsin's more elusive natives, the queen snake (*Regina septemvittata*). I had the pleasure of meeting Sam at last year's Midwest Herpetological Symposium in Madison, Wisconsin. What I noticed immediately about Sam is his ability to tell a great story, the hallmark of any great herper. This particular story involved all the hours and hard work he put into finding a queen snake, a not so small feat it turns out.

In Wisconsin queen snakes live in what are considered to be glacial relicts, habitats, now isolated, that have persisted relatively unchanged since the last Ice Age glaciers receded north. In such habitats, if you're dedicated and committed enough, you may be lucky enough to find species like queen snakes and northern ribbon snakes (*Thamnophis sauritus septentrionalis*). They require clear, rocky streams that are vulnerable to human disruption, which is problematic considering they are only found

in a small portion of Wisconsin to begin with. Other, more generalist herp species that you might see in the same habitats include northern water snakes (*Nerodia sipedon*) and various amphibians. Queen snakes are unusual in that their diet is composed almost entirely of freshly-molted crayfish. Invasive species like the rusty crayfish can quickly outcompete native species and drive them out, perhaps adversely affecting queen snake populations.

Overall, Sam gave a great talk and we all walked away with a greater appreciation for Wisconsin's native reptiles, as well as the effort and commitment it takes to find these animals. Luckily for us, Sam will soon be moving to California to pursue a master's degree studying the evolutionary biology of rattlesnakes. Why is this good news you might be asking? That means we can drag him back to hear tales of tracking down rattlesnakes in their natural habitat in that unique way he tells his stories.

39TH INTERNATIONAL HERPETOLOGICAL SYMPOSIUM

ST LOUIS, MISSOURI
JUNE 22-25, 2016

Unofficial Minutes of the CHS Board Meeting, February 12, 2016

President John Belah called the meeting to order at 7:55 P.M. Board members John Archer, Brandon Ottolino and Jessica Wadleigh were absent.

Officers' Reports

Recording secretary: Minutes from the January 15 board meeting were read, corrected and accepted.

Treasurer: Amy Sullivan read the financial report. She will be moving in June. She will be able to manage most duties remotely with help from Mike Dloogatch.

Membership secretary: Mike Dloogatch read the list of expiring memberships.

Corresponding secretary: Amy Bochenko needs some letterhead stationery.

Sergeant-at-arms: There were 31 in attendance at the January meeting.

Committee Reports

Shows:

- Notebaert Nature Museum, first full weekend of each month.
- Chicago Family Palooza, Pheasant Run Resort, St. Charles, February 27–28.
- Kids Expo, Schaumburg Convention Center, February 27–28.
- Reptile Rampage, Lake Forest, March 6.
- Chicagoland Family Pet Expo, Arlington Park Racetrack, March 18–20.
- NARBC, Tinley Park, March 19–20.
- Kids Expo, Holiday Inn Convention Center, Tinley Park, April 16–17.

The Junior Herpers have been invited to the One Earth Film Festival at the Oak Park Library. They would like kids to bring animals for display. Brookfield Conservation Center sent a thank-you for CHS participation at Meet the Creek. They also sent a donation of \$300. Dick noted that member participation at shows has improved.

Adoptions: There was a discussion of what to do with the adoptions fund. This is a restricted fund with several thousand dollars in it. Mike Dloogatch moved to cease taking in animals for adoptions and to cease adding to the adoptions fund. The motion passed unanimously.

Junior herpers: Attendance at the February meeting was 60.

There was good participation. More high school kids have been coming to the meetings. Colleen and Rich are considering some field trips and have been in contact with several herp societies in the area to coordinate with for the trips.

Library: Aaron will pick up a UV meter at NARBC. There are some books that have been stored in Steve Sullivan's office that need to be reviewed to see if they are worth keeping.

Old Business

ReptileFest: An organizing meeting was held on January 30. Everything is progressing. Barbara Hood is working on getting the online exhibitor registration up. Jason Hood is arranging the donation of water that we sell for conservation donations. John Bellah mentioned that Zilla wants to sponsor 'Fest. This was discussed since ZooMed has been a sponsor for a number of years. It was recommended that John Bellah talk to John Archer about this. A magazine plans to run a feature on ReptileFest. They want to do a photo shoot with a child. They are asking for use of a green animal.

Midwest Symposium: John Bellah is working on getting speakers. Six hotels are under consideration. Should have a decision soon. The Madison Area Herp Society wants to sponsor a child and parents to attend. Colleen suggested similarly sponsoring a child from Jr. Herpers. She thought of making some kind of contest as a way to pick someone.

Bylaws: John Archer was not present. Discussion was tabled until next month's meeting. Everyone was encouraged to read the document John sent out last month with suggested changes

New Business

Mike Scott needs more magnets to sell. He was unclear whether we still have any and where more can be purchased.

Grant proposals: The CHS awarded 8 grants for 2016, totaling \$7500.

John Bellah got a call from a reporter from PetMD. This may be a website. The reporter asked about breeding turtles.

The meeting adjourned at 9:10 P.M.

Respectfully submitted by recording secretary Teresa Savino

Herpetology 2016

In this column the editorial staff presents short abstracts of herpetological articles we have found of interest. This is not an attempt to summarize all of the research papers being published; it is an attempt to increase the reader's awareness of what herpetologists have been doing and publishing. The editor assumes full responsibility for any errors or misleading statements.

AGE-STRUCTURE AND POPULATION DECLINE

J. Middleton and D. M. Green [2015, *Herpetologica* 71(3):190-195] note that animal populations that normally fluctuate in size in response to stochastic environmental events might be subject to unsustainably high mortality rates in the face of progressive habitat loss or degradation. This should perturb the population's age-structure in predictable ways if the increase in mortality is age- or stage-specific (i.e., a decline in recruitment should result in a progressively older adult population, whereas a decline in adult survivorship should result in a progressively younger adult population). We used skeletochronology to ascertain the ages of adult individuals in a population of Fowler's Toads, *Anaxyrus* (= *Bufo*) *fowleri*, over 20 yr, spanning a period of regulated population fluctuation from 1992 to 2002 and a period of sustained population decline thereafter until 2011. Age structure was similar between sexes, but was highly variable during both periods. Although there was no temporal trend detected in average age among 420 toads during the predecline period, 1992–2000, there was an increase in average age among 469 toads during the decline period, 2002–2011, with no significant change in adult survivorship. This evidence of an aging population is consistent with a reduction in recruitment in the population, related to the progressive loss of breeding habitat caused by an invasive plant, demonstrating that amphibian populations may be threatened with decline even when mortal threats to adults have not increased.

TIMBER RATTLESNAKES IN NEW JERSEY

L. M. Bushar et al. [2015, *Herpetologica* 71(3):203-211] note that timber rattlesnakes, *Crotalus horridus*, are an endangered species in New Jersey, where high human population density places extraordinary pressures on natural populations. Disjunct populations are found in both the northern part of the state and a few scattered locations in the southern Pine Barrens. The Pine Barrens populations were previously shown to have reduced levels of genetic diversity compared to other populations in the Mid-Atlantic region. This study used microsatellite DNA to examine the remaining six known *C. horridus* populations in the Pine Barrens and two in the northern part of the state. The results indicated that the sampled populations represented four genetic subgroups, the two northern populations comprised one subgroup and the remaining six Pine Barrens populations comprised the other subgroups. Although there was evidence for isolation by distance among the Pine Barrens populations, geographic distance alone did not account for a substantial amount of among-group variation. The combined analyses implicated paved roads as primary isolating barriers between populations. Given their geographic isolation and reduced levels of genetic diversity, intensive efforts may be required to ensure the persistence of the behaviorally and genetically unique *C. horridus* populations of the New Jersey Pine Barrens.

AMERICAN CROCODILES IN PANAMA

M. Venegas-Anaya et al. [2015, *J. Herpetology* 49(3):349-357] conducted nocturnal surveys in the insular and coastal areas of Coiba National Park (CNP) and its mainland buffer zone in Panama (Chiriquí conservation site) from 2009–2012 to determine the conservation status of *Crocodylus acutus*. In 99 nights, they surveyed 147.2 km and captured 185 animals during nocturnal transects inspection with headlamps. Overall, sex ratio was 1.00:1.01 female/male with significant differences by size/age class and year. Females were slightly larger in total length than males (115.1 ± 56.9 cm-females, 105.4 ± 71.8 cm-males). The encounter rate was calculated based on number of animals captured per km of surveyed transect. The *C. acutus* encounter rate per year was 1.8 ind/km (60 ind/33.5 km/12 places visited) in 2009, 1.0 ind/km (90 ind/87.4 km/18 places visited) in 2010, and 1.3 ind/km (35 ind/26.3 km/8 places visited) in 2012. The animals showed a dispersed pattern in most sites on CNP. Captured *C. acutus* were found in 581.1 km² total area within 78% natural habitat, including mangroves and beaches, and 22% disturbed habitat on both the mainland and the islands. In addition, the spatial analysis showed reduction in natural land cover; crocodile habitat showed limited conversion to agricultural land use; and crocodile population size was correlated with protected areas. The differences between mainland and island populations regarding ecology suggest that a long-term monitoring program for American crocodiles is necessary to distinguish between natural fluctuations and anthropogenic changes on population dynamics and conservation status.

SURVIVAL OF TIMBER RATTLESNAKES

Z. H. Olson et al. [2015, *Herpetologica* 71(4):274-279] used radio telemetry to monitor 47 adult timber rattlesnakes (*Crotalus horridus*) during five active seasons and four overwinter periods from April 2007 through November 2011 in south-central Indiana. The study period serendipitously encompassed an oak (*Quercus* spp.) mast failure and subsequent 50% decline in prey abundance, allowing the authors to test hypotheses about ecological effects on survival. Ten mortalities were detected. The causes of mortality during active seasons included predation ($n = 5$), human persecution ($n = 2$), and vehicle strike ($n = 1$). Variation in active season survival was explained best by the interaction of sex and prey availability along with an effect of marking cohort. Seasonal survival estimates ranged from 0.720 to 0.983 with female survival decreasing by at least 15% the year after prey availability declined. Overwinter survival was high in general ($n = 2$ mortalities), with estimates weakly affected by sex (male = 0.966; female = 0.990) and decreasing slightly with colder monthly temperatures. Although ecological effects were most powerful in this study, 30% of mortalities were associated with human activities. Focused education and outreach efforts may be useful for improving survival of timber rattlesnakes.

EXOTIC INTRODUCTIONS IN SERBIA

A. Urošević et al. [2016, *Herpetozoa* 28 (3/4):115-132] report on introduced exotic species and range expansion of native species in Serbia. The four most important introductions are the alien, invasive *Trachemys scripta elegans* and native *Testudo hermanni*, *Mediodactylus kotschy* and *Podarcis muralis*, which expanded their ranges. *Trachemys scripta elegans* should be of special concern, since introductions of this species can have numerous negative effects on local ecosystems. incidental introductions were documented for two alien (*Pelodiscus* sp. and *Hemidactylus turcicus*) and two native species (*Podarcis tauricus* and *Vipera ammodytes*). The greatest number of introductions is concentrated around the cities of Belgrade and Novi Sad. Increased traffic, trade and cargo shipment, as well as many people who keep exotic animals as pets, make large urban areas susceptible to accidental and deliberate introductions of amphibians and reptiles. On the other hand, anthropogenic alteration and degradation of habitats, along with increased urbanization, can provide corridors for the range expansion of native species.

AGE AND CALLING EFFORT IN GRAY TREEFROGS

M. C. Kuczynski et al. [2015, *Copeia* 103(3):530-535] note that current models indicate that life history trade-offs between current and future reproduction can have a major influence on sexual signaling. Individuals with fewer future reproductive opportunities—regardless of current effort—are expected to allocate greater resources to current reproductive effort (terminal investment) because of the low marginal survival cost to signaling. This study examined the effect of age and physical condition on the calling behavior of the gray treefrog (*Hyla versicolor*) to test the prediction that older males should exhibit greater signaling efforts compared to younger males of similar condition. Contrary to predictions, calling males showed no significant effect of age or condition on any of the three call properties measured (length, rate, effort). The authors offer possible explanations for the apparent discrepancy between theoretical predictions and their observations from the field.

CHICKEN TURTLE NESTING AND ACTIVITY

D. T. McKnight et al. [2015, *Copeia* 103(4):1043-1047] note that the eastern and Florida chicken turtle subspecies (*Deirochelys reticularia reticularia* and *D. r. chrysea*) exhibit nesting cycles that are atypical for aquatic North American turtles, with nesting occurring in the fall, winter, and early spring. The reproductive cycles of the western subspecies (*D. r. miaria*), however, have not been studied. Therefore, the authors monitored the reproductive status of female *D. r. miaria* in 2012 and 2013. In their populations, both male and female *D. r. miaria* were inactive on land from mid-July to mid-March. This differs from the activity patterns of the other subspecies in which females typically remain active into the fall and sometimes winter. Also, in contrast to the nesting patterns of *D. r. reticularia* and *D. r. chrysea*, female *D. r. miaria* developed follicles in the spring and summer (March–July) and contained eggs in the summer (May–July). Therefore, the western chicken turtle exhibits a nesting pattern more similar to that of other sympatric species in the family Emydidae than to other subspecies of *D. reticularia*.

DESERT TORTOISE THERMAL ENVIRONMENT

J. S. Mack et al. [2015, *J. Herpetology* 49(3):405-414] note that Agassiz's desert tortoises (*Gopherus agassizii*) spend >95% of their lives underground in cover sites that serve as thermal buffers from temperatures, which can fluctuate >40°C on a daily and seasonal basis. They monitored temperatures at 30 active tortoise cover sites within the Soda Mountains, San Bernardino County, California, from February 2004 to September 2006. Cover sites varied in type and structural characteristics, including opening height and width, soil cover depth over the opening, aspect, tunnel length, and surficial geology. Analyses were focused on periods of extreme temperature: in summer, between July 1 and September 1, and winter, between November 1 and February 15. With the use of multivariate regression tree analyses, it was found that cover-site temperatures were influenced largely by tunnel length and subsequently opening width and soil cover. Linear regression models further showed that increasing tunnel length increased temperature stability and dampened seasonal temperature extremes. Climate change models predict increased warming for southwestern North America. Cover sites that buffer temperature extremes and fluctuations will become increasingly important for survival of tortoises. In planning future translocation projects and conservation efforts, decision makers should consider habitats with terrain and underlying substrate that sustain cover sites with long tunnels and expanded openings for tortoises living under temperature extremes similar to those described here or as projected in the future.

EFFECTS OF FIRE ON OAK TOADS

C. F. Noss and B. B. Rothermel [2015, *J. Herpetology* 49(3):364-370] note that the direct and indirect effects of fire on different life stages of amphibians are poorly understood and difficult to predict given interspecific variation in physiology and life history. The authors investigated how time-since-fire (TSF) of seasonal ponds embedded within Florida scrub habitat affected growth, development, and survival of larval oak toads (*Anaxyrus quercicus*). They selected 12 ponds at Archbold Biological Station on the southern Lake Wales Ridge, Florida: four burned within the last 4 mo, four burned 3–4 yr ago, and four burned 11 yr ago. They hatched and reared three clutches of oak toads in the laboratory for 2 wk and then sorted larvae into groups of 24 having equal representation from each clutch. They randomly assigned groups of larvae to 0.22-m³ mesh field enclosures in each pond (n = 2–3 enclosures per pond) and measured environmental variables that might contribute to observed amphibian responses including pH, temperature, and periphyton growth. After 15 d, when larvae began metamorphosing, mean survival was significantly higher in the most recently burned ponds. The TSF did not have a significant effect on developmental stage or tadpole size, although oak toad larvae tended to develop faster in the most recently burned ponds. Although all ponds were acidic (pH < 4.3), there was a trend toward higher pH in the more recently burned ponds, and survival was significantly positively correlated with pH. Overall results suggest that performance and recruitment of larval oak toads are higher in recently burned ponds.

Advertisements

For sale: **highest quality frozen rodents.** I have been raising rodents for over 30 years and can supply you with the highest quality mice available in the U.S. These are always exceptionally clean and healthy with no urine odor or mixed in bedding. I feed these to my own reptile collection exclusively and so make sure they are the best available. All rodents are produced from my personal breeding colony and are fed exceptional high protein, low fat rodent diets; no dog food is ever used. Additionally, all mice are flash frozen and are separate in the bag, not frozen together. I also have ultra low shipping prices to most areas of the U.S. and can beat others shipping prices considerably. I specialize in the smaller mice sizes and currently have the following four sizes available: Small pink mice (1 day old—1 gm) , \$25 /100; Large pink mice (4 to 5 days old—2 to 3 gm), \$27.50 /100; Small fuzzy mice (7 to 8 days old—5 to 6 gm) , \$30/100; Large fuzzy mice /hoppers (10 to 12 days old—8 to 10 gm), \$35/100 Contact Kelly Haller at 785-234-3358 or by e-mail at kelhal56@hotmail.com

For sale: 25 large, heavy-duty, open-top white plastic tubs, most with installed drains, perfect for aquatic/semi-aquatic turtles, small lizards, etc. Segments of PVC drain pipe fitted to tubs can be included with purchase. Each tub is approximately 36 inches by 66 inches, and approximately 12 inches in depth. All are gently used and in great shape. Asking \$75 each, \$65 each for 2 or more. Pick-up only from Kenosha, Wisconsin, area. Contact Jim or Kirsten at (262) 331-3423.

For sale: Standard 24" Neodesha reptile cages, 3 × 6" vent on top, tempered glass front. Like new condition, no burns or stains, original glass. These cages do not have the dam (horizontal molding that crosses the entire front width of the cage, used to hold back bedding material)—easier to clean without the dam. About 20 currently available, \$45 each. Linda Malawy, (630) 717-9955, linda_malawy@hotmail.com.

Herp tours: **Costa Rica herping adventures.** Join a small group of fellow herpers for 7 herp-filled days. We find all types of herps, mammals, birds and insects, but our target is snakes. We average 52 per trip, and this is our 10th year doing it. If you would like to enjoy finding herps in the wild and sleep in a bed at night with air-conditioning, hot water and only unpack your suitcase once, instead of daily, then this is the place to do it. Go to our web-site <http://hiss-n-things.com> and read the highlights of our trips. Read the statistics of each trip and visit the link showing photos of the 40 different species we have found along the way. E-mail at jim.kavney@gmail.com or call Jim Kavney, 305-664-2881.

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ReptileFest 2016

OK, folks, it's time to come to the aid of the party. Well, it's not a party but it is a lot of fun. If you've worked ReptileFest before you know it's fun, and if you haven't, you're missing out! The second word in our mission statement is "educate," and ReptileFest is our biggest effort toward enlightening the public about these animals that occupy so much of our thinking. We can't do it without you. For two days you have lots of fun; we feed you and give you a T-shirt and treat you really nice. For all the advantages that you've gained from your membership, and I suspect there are more than you immediately recall, we ask two days in April during which you will have a thoroughly good time.

We need you to sign up now. We're at a new venue and we need extra time to set up and plan. So go online. Sign up. Look forward to having fun.

I know I am.

April 9 & 10
Northeastern Illinois University
Physical Education Complex
3600 W Foster Ave, Chicago

Sign up to exhibit at: <http://chicagoherp.wix.com/reptilefest#!get-involved/crxa>

UPCOMING MEETINGS

The next meeting of the Chicago Herpetological Society will be held at 7:30 P.M., Wednesday, March 30, at the Peggy Notebaert Nature Museum, Cannon Drive and Fullerton Parkway, in Chicago. **Gerry Salmon** will speak on “Saving Herps — One at a Time: Working as a Timber Rattlesnake Monitor on Pipelines and Wind Farms in the Northeast.” His presentation will include highlights of his work with timber rattlesnakes (*Crotalus horridus*) and conservation efforts that became the basis for a recent seasonal employment protecting threatened wildlife in areas of heavy construction. Gerry has been an avid naturalist for most of his life (he is 55 years old). He has a strong interest in herpetology and geographic distribution of North American reptiles and amphibians.

At the April 27 meeting, **George L. Heinrich**, a field biologist and environmental educator specializing in Florida reptiles, will speak on “Turtle Science: Why Turtles Are Cool.” This presentation will introduce the fascinating world of turtles and turtle science.

The regular monthly meetings of the Chicago Herpetological Society take place at Chicago’s newest museum—the **Peggy Notebaert Nature Museum**. This beautiful building is at Fullerton Parkway and Cannon Drive, directly across Fullerton from the Lincoln Park Zoo. Meetings are held the last Wednesday of each month, from 7:30 P.M. through 9:30 P.M. Parking is free on Cannon Drive. A plethora of CTA buses stop nearby.

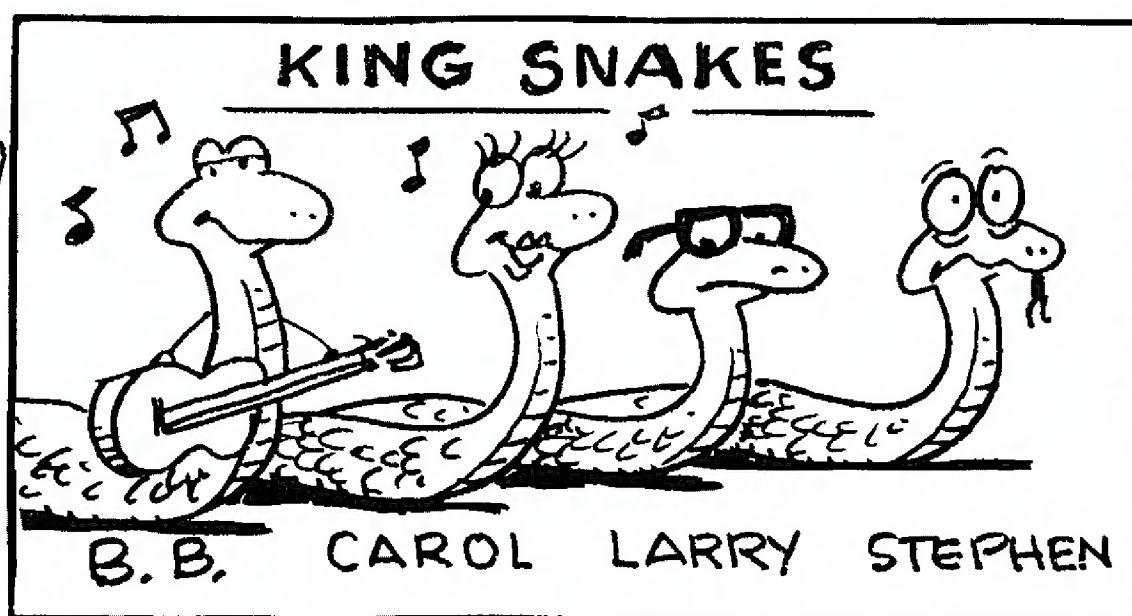
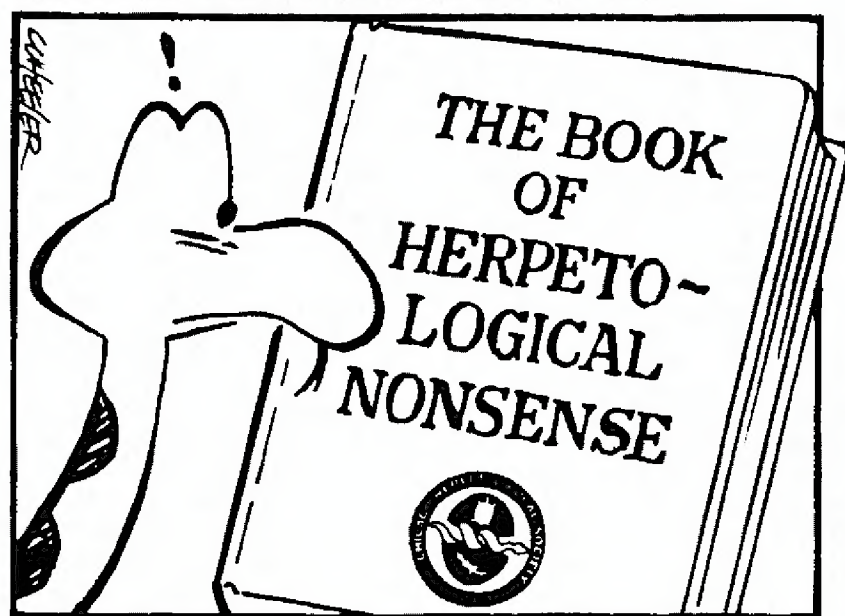
Board of Directors Meeting

Are you interested in how the decisions are made that determine how the Chicago Herpetological Society runs? And would you like to have input into those decisions? If so, mark your calendar for the next board meeting, to be held at 7:30 P.M., Friday, April 15, 2016, at the Schaumburg Township District Library, 130 S. Roselle Road, Schaumburg.

The Chicago Turtle Club

The monthly meetings of the Chicago Turtle Club are informal; questions, children and animals are welcome. Meetings normally take place at the North Park Village Nature Center, 5801 N. Pulaski, in Chicago. Parking is free. For more info visit the group’s Facebook page.

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